

REMARKS

By this amendment, Applicants have amended independent claims 1 and 16 to more clearly define their invention. In particular, claims 1 and 16 have been amended to clarify that the first and second plate-like ceramic heating elements are electrically contacted on opposite flat sides by flat electrical conductors. The claims have also been amended to clarify that each of the further flat electrical conductors (claim 1) or each of the at least two flat conductors (claim 16) is contact with only a respective one of the first and second heating elements. See, e.g., Figure 5 in the description thereof in Applicants' specification. Claim 9 has been amended to be in independent form by including therein all of the limitations of claims 1 and 2, from which claim 19 previously depended.

Claims 1, 3-5, 10, 13, and 16-18 stand rejected under 35 U.S.C. 102(b) as allegedly being anticipated by U.S. patent number 5,658,479 to Tadokoro.

Applicants traverse this rejection and request reconsideration thereof.

The present invention relates to a heating device. As shown, by way of example, only in Figure 5, the heating device 1 includes at least first and second plate-like ceramic heating elements 6.1, 6.2. The heating elements 6.1, 6.2 are electrically connected on opposite flat sides by flat electrical conductors. For example, the heating elements 6.1, 6.2 may engage directly with a flat side 6.1a, 6.2a on the upper cover surface 2b of the casing 2. On another flat side of the heating elements 6.1, 6.2, there are at least two further flat electrical conductors 5.1, 5.2. For example, one of the electrical conductors 5.1 can be contact with another flat side of only a respective one of the heating elements 6.1, while another electrical conductor 5.2 can be contact with the heating element 6.2 (directly or, in the case

shown in Figure 5, through a conductor spacer 7.2 and/or a contact plate 5.3). In this matter, the first heating element 6.1 and the second heating element 6.2 can be separately supplied with a voltage so that one or both of the first and second elements 6.1, 6.2 can be heated.

The Tadokoro patent discloses a positive temperature coefficient thermistor heater composed of a positive temperature coefficient thermistor element, and electrodes formed on both principal faces of the thermistor element. At least one of the electrodes consists of split electrodes. While it is disclosed that a plurality of PTC thermistor heaters 2 can be used, the terminals that electrically connect the heaters 2 appear to connect with all of the heaters 2. That is, a first terminal 3 makes electrical connection through the first case 6 with the first electrodes 22 on one side of the heaters 2, while power supply terminals 9, 10 are brought into contact with the second electrodes 23 and 24 of the heaters 2. Thus, whereas the present invention uses two further flat electrical conductors each one of which is an electrical contact with only a respective one of the heating elements, the terminals 9, 10, as well as the terminal 3 of Tadokoro appears to contact all of the heating elements 2. Cf, numbered section 10 of the Office Action.

Despite these differences, the Examiner rejects claim 1 with an argument that, in his opinion, Tadokoro teaches a heating device comprising at least two plate-like ceramic heating elements 2, which in the Examiner's opinion are electrically contacted on opposite flat sides by power supply terminals 9 and 10 and on at least one flat side is provided at least one flat electrical conductor 22, wherein on another flat side of the heating elements there are at least two further flat electrical conductors 23 and 24 for the heating element 2. Accordingly, the Examiner

designates in claim 1 the parts 23 and 24 as “electrical conductor,” while with regard to claim 3, he designates parts 4a and 4b as – the same – electrical conductors. He omits in this connection the word “two” of claim 3. In this connection the Examiner's arguments with regard to claim 1 and claim 3 are not consistent.

Moreover, the Examiner gives the different parts of the device of Tadokoro meanings which are not the normal meanings or designations used in normal technical speech.

Parts 23, 24 of Tadokoro are not conductors in the sense of the invention. They are metallisations provided on the ceramic heating elements in order to insure a better electrical contact between the ceramic heating elements and the conductors 9, 10.

In any case, it is clear from the specification of the subject application and the drawings, that the ceramic heating elements are, according to the invention, contacted on opposite flat sides by flat electrical conductors and not by other elements different from these conductors as the Examiner insinuates. Moreover, clearly the conductors of claim 3 are same as the conductors of claim 1.

When comparing amended claims 1 and 16 with the subject matter of Tadokoro, at least the last feature of claims 1 and 16 is not suggested by Tadokoro, i.e. the conductors or terminals 9, 10 of Tadokoro are in contact with both ceramic heating elements and not with only a respective one of the first and second heating elements. Cf, numbered section 10 of the Office Action.

According to the present invention, the conductors or terminals on one side of the ceramic elements do not supply (as the terminal or conductor on the other side) all ceramic elements, but the conductors 5.1a and 5.2a supply different groups of

heating elements (note the heating device has “at least first and second” heating elements) or different heating elements.

Accordingly, the patent to Tadokoro does not disclose nor would not have suggested the presently claimed invention.

Claims 1, 2, 9 and 10 stand rejected under 35 U.S.C. 103(a) as unpatenable over U.S. patent number 4,841,127 to Prager et al. Applicants traverse this rejection and request reconsideration thereof.

The Prager et al. patent discloses a dual temperature hair curler which has a hollow heat transmitting metallic barrel enclosing a pair of PTC heaters connected in series to each other and electrically insulated from the barrel by an oxide-filled silicon rubber material. As shown in Figures 1A and 1B of Prager et al., lead-in wires 4 extend inside of the barrel to PTC heater 2a while lead-in wires 5 extend to PTC heater 2b. Each of the sets of lead-in wires 4 and 5 are welded to opposite sides of the PTC heaters 2a and 2b. Thus, the Prager et al., as shown in Figure 1A and as described at column 3, lines 17-28 utilizes lead-in wires not flat electrical conductors, as presently claimed. Lead-in wires generally have a circular construction and are not flat conductors as are used in the heating device of the present invention. Accordingly, the Prager et al. patent does not disclose the presently claimed invention.

It is correct, that in Prager both ceramic plates 2a, 2b are supplied by different terminals 4 respectively 5. But the disadvantage of Prager is that the contact is made by usual wires which are brought in contact with a ceramic element by welding or fusing and, as seen from the drawings, only contact the ceramic elements at one end, but not on (merely) the whole flat side of the contact elements. Accordingly, the

current distribution over the height of the ceramic elements is not uniform but non-uniformly distributed (along the length of the elements). The same is the case for the heat production. Heat is created at the left end of the ceramic plates between the contact areas of the wires, but less in the middle and on the right side of the elements.

A further disadvantage is that in order to insulate the wires 4 and 5 the ceramic plates must be embedded in silicon rubber, which though magnesium oxide filled does not provide a good heat transfer to the barrel and in particular to the outside of the barrel. In this connection it should be understood (as one of ordinary skill in the art knows) that the efficiency of a ceramic PTC element is the better when heat produced by the element is conducted away from the PTC-element.

Moreover, a disadvantage is that, for connecting two PTC heaters, Prager needs totally four wires or terminals, whereas the invention only needs three as one of the terminals or conductors of the invention contacts at the same time two ceramic elements or two groups of ceramic elements Prager gives no hint to those of ordinary skill in the art to design a device according to the invention and with the features of the inventive device.

For the foregoing reasons, the presently claimed invention is neither disclosed nor suggested by Prager et al.

Claims 6 and 7 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Tadokoro in view of Nanerth. Applicants traverse this rejection and request reconsideration thereof.

The patent to Nauerth discloses an electrical resistance-heating element having at least one heating conductor of positive-temperature-coefficient material

having contact means on opposite surfaces. If more than one heating element is provided, they may be arranged in a row or in a stack. Electrical connection is made to the heating conductor or the row or stack through two substantially plane contact plates adapted to the layout of the heating conductor, row or stack and placed loosely upon opposite contact surfaces thereof. The components are held together elastically by securing means holding the edges of the contact plates. However, nothing in Nauerth remedies the basic deficiencies of Tadokoro noted above. Therefore, claims 6 and 7 are patentable over the proposed combination of patents.

Claim 14 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tadokoro in view of Van Bokestal et al. Applicants traverse this rejection and request reconsideration thereof.

The Examiner has cited the Van Bokestal et al. patent as disclosing heat elements comprising conductors and spacers encased in a molded insulating frame. However, nothing in Van Bokestal et al. would remedy any of the basic deficiencies noted above with respect to Tadokoro. Accordingly, claim 14 is patentable over the proposed combination of references.

Claim 15 also stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tadokoro in view of Van Bokestal et al. Applicants traverse this rejection and request reconsideration thereof.

The rejection of claim 15 is traversed for the reasons noted above with respect to claim 14. Moreover, the Examiner has not set a *prima facie* case of obviousness since the Examiner has not set forth the teachings in Tadokoro and Van Bokestal et al. which would have suggested the presently claimed invention and has not provided a line of reasoning as to why it would have been obvious to make the

modifications noted by the Examiner. Accordingly, claim 15 is patentable for this additional reason.

Claim 8 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Tadokoro et al. Applicants traverse this rejection and request reconsideration thereof.

The Tadokoro does not disclose or would not have suggested the invention for the reasons set above. Moreover, the Examiner's allegation that the inclusion of an insulating spacer between two conductors is a matter of design choice does not meet the requirements for properly supporting an obviousness rejection with evidence. Accordingly, is patentable over Tadokoro for this additional reason.

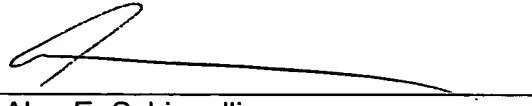
Applicants note the indication of allowable subject matter in claim 19. However, in view of the foregoing amendments and remarks, it submitted all of the claims now in the application are in condition for allowance.

Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to the Antonelli, Terry, Stout & Kraus, LLP Deposit Account No. 01-2135 (Docket No. 321.43752X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

ANTONELLI, TERRY, STOUT & KRAUS, LLP

By


Alan E. Schiavelli
Reg. No. 32,087

Telephone: (703) 312-6600
Facsimile: (703) 312-6666
AES/at